IN THE SPECIFICATION:

Please replace paragraph [0001] with the following amended paragraph:

[0001]   This application contains subject matter that is related to the subject matter described in U.S. patent application serial number [[_____,]] 10/650,117, filed August 27, 2003 ~~simultaneously herewith (Attorney docket number WEAT 0347)~~ and U.S. patent application serial number [[_____,]] 10/649,590, filed August 27, 2003 ~~simultaneously herewith (Attorney docket number WEAT 0493)~~, which are both incorporated herein by reference in their entirety.

Please replace paragraph [0021] with the following amended paragraph:

[0021]   Time-division multiplexing of the sensors is achieved using two-pulse heterodyne sub-carrier technique. In one embodiment of the invention, the light source 104 produces two pulses within two time-slots, where the time-slots have a length equal to the sensor delay imbalance. The phase of the second pulse is modulated, which generates a sub-carrier on the reflected signal. The amplitudes of each pulse in the reflected pulse train are detected by the light detector 106. At the generated sub-carrier frequency, both phase and amplitude of the interference are measured. While those skilled in the applicable arts will readily comprehend two-pulse interrogation and demodulation, commonly assigned and co-pending United States Patent Application Serial   Number   [[_____,]]   10/650,117,   entitled,   "METHOD   AND APPARATUS   FOR   PROVIDING   POLARIZATION   INSENSITIVE   SIGNAL PROCESSING   FOR   INTERFEROMETRIC   SENSORS",   which   was   filed   on [[_____]] ~~(Attorney Docket Number WEAT/0347)~~, August 27, 2003, which   is   hereby   incorporated   by   reference,   describes   such   interrogation techniques in detail.

Please replace paragraph [0023] with the following amended paragraph:

[0023]   Figure 2 depicts an interrogation pulse pair 200 comprising a first pulse 202 and a second pulse 204 as well as a reflected pulse train 206 from a sensor group with five reflectors (i.e., four sensors). The length of the reflected pulse train 206 from the sensor group is in principle infinite, due to the multiple reflections within the sensor group.   The interference between reflections of the two interrogation pulses causes a time varying amplitude for each reflected pulse indicated by the diagonal lines in each pulse 210 through 232. Note that the amplitude of the first pulse 208 in the reflected pulse train 206 is constant, since this pulse is the reflection of the first interrogation pulse from the first reflector, and therefore it has no interference term. The length of the pulse train is infinite, however only pulses 210, 212, 214 and 216 are needed for demodulation of the phase responses of the five sensors. The pulses after pulse 216 are called tail pulses, and they do not include any first order reflections. These pulses must fade out to an amplitude given by the maximum allowed crosstalk level before a new pulse train can be received. The length of the tail is given by the reflectivities of the reflectors, and thus the reflectivities limit the repetition rate. The number of pulses that has to be detected in order to calculate the sensor responses is equal to the number of reflectors.   Let the 2x2 complex Jones matrix h_j be the j'th sample of the impulse response of the group. The electric field phasor of the part of pulse j in the reflected pulse train sequence that is originating from a reflection of the first pulse is given by

$$\mathbf{E}_d(0,j) = \mathbf{h}_j \mathbf{E}_m(0) \tag{1}$$

where $\mathbf{E}_m(0)$ is the electrical field phasor of the first interrogation pulse. While, the electric field phasor of the part of pulse j in the reflected pulse train sequence that is originating from a reflection of the second pulse is given by

$$\mathbf{E}_d(1, j) = \begin{cases} \mathbf{0} & : j = 0 \\ \mathbf{h}_{j-1}\mathbf{E}_m(1) & : j > 0 \end{cases} \tag{2}$$

where $\mathbf{E}_m(1)$ is the electrical field phasor of the second interrogation pulse. h_0 represents the transmission through the lead fiber and the reflection from the first reflector, while h_1 is the transmission through the lead fiber and the first sensor and the

reflection from the second reflector. Relative to h_0, h_1 includes information about the state of the first sensor. h_2 includes the transmission through the lead fiber, first and second sensor, which gives information about the second sensor. However, h_2 also includes a third order reflection which involves two reflections from first reflector and one reflection from the second reflector. This term leads to crosstalk from sensor 1 to sensor 2. The detected power of each pulse of the reflected pulse train sequence is given by,

$$I(0) = \mathbf{E}_d^\dagger(0,0)\mathbf{E}_d(0,0)$$
$$= \mathbf{E}_m^\dagger(0)\mathbf{h}_0^\dagger\mathbf{h}_0\mathbf{E}_m(0) = I_p(0) \tag{3}$$

$$I(j) = \mathbf{E}_d^\dagger(0,j)\mathbf{E}_d(0,j) + \mathbf{E}_d^\dagger(1,j)\mathbf{E}_d(1,j) + 2\,\mathrm{Re}\left\{\mathbf{E}_d^\dagger(1,j)\mathbf{E}_d(0,j)\right\}$$
$$= \underbrace{\mathbf{E}_m^\dagger(0)\mathbf{h}_j^\dagger\mathbf{h}_j\mathbf{E}_m(0) + \mathbf{E}_m^\dagger(1)\mathbf{h}_{j-1}^\dagger\mathbf{h}_{j-1}\mathbf{E}_m(1)}_{I_p(j)} + \underbrace{2\,\mathrm{Re}\left\{\mathbf{E}_m^\dagger(1)\mathbf{h}_{j-1}^\dagger\mathbf{h}_j\mathbf{E}_m(0)\right\}}_{I_i(j)} \tag{4}$$

here † is the conjugate transpose operator and $I(j)$ is the measured power of the jth reflected pulse. The detected power is split into the non-interfering part $I_p(j)$, that appears around DC and the interfering part $I_i(j)$ that appears around the sub-carrier frequency. The interfering part is given by,

$$I_i(j) = 2\,\mathrm{Re}\left\{\mathbf{E}_m^\dagger(1)\mathbf{H}^{(j-1,j)}\mathbf{E}_m(0)\right\}, \tag{5}$$

where $\mathbf{H}^{(j-1,j)} = \mathbf{h}_{j-1}^\dagger\mathbf{h}_j$. The Jones matrix $\mathbf{H}^{(j-1,j)}$ is determined using a polarization resolved measurement method, such as the technique described in United States Patent Application Serial Number [[_____,]] 10/650,117, filed [[_____]] August 27, 2003. (Attorney Docket Number WEAT/0347).